The Risk of Mental Health Disorders Among U.S. Military Personnel Infected with Human Immunodeficiency Virus, Active Component, U.S. Armed Forces, 2000-2011

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Mental health disorders (MHD) are reportedly more common among soldiers and airmen with HIV than their seronegative counterparts. This report documents the incidence rates of MHD among HIV-positive members of all service branches and compares the rates to those of two HIV-unexposed control groups: an HSV2-infected group and a group without documented HIV or HSV2 infections. Approximately 56 percent of HIV-infected service members received an incident diagnosis of a MHD six months or more after the initial detection of their infections. Cumulative incidence rates in nearly all MHD categories of interest were highest in the HIV group, intermediate in the HSV2 group and lowest in the referent group. The disorders more frequently diagnosed among HIV-infected service members compared to their uninfected counterparts were psychosis/schizophrenia, substance dependence, substance abuse, bipolar disorder, suicide ideation and depression. The findings are consistent with previous studies and reiterate the importance of long-term and comprehensive clinical monitoring of individuals diagnosed with HIV-1 infections.

In the U.S. Armed Forces, periodic screening for HIV infection among all active and reserve component service members began in 1986.[1] By 2004, the Department of Defense had established a policy of HIV antibody testing every two years for all members of the uniformed services.[1] From 1 January 2000 through 30 June 2010, 2,114 incident HIV-1 infections were identified among active component military members.[1] Infection with HIV does not require medical separation from the military; however, HIV-infected service members are ineligible for deployment, appointment as officers and entry into certain career fields.[2]

Individuals with HIV often suffer from mental health disorders (MHD). Several studies have estimated the prevalence of MHD among individuals diagnosed with HIV infection. For example, among patients seeking care at HIV clinics, approximately half of both civilians and military veterans were reported to have symptoms consistent with depression.[3,4] Among HIV-infected patients receiving care at a mixed urban and rural HIV clinic, Pence and colleagues documented that 39 percent were diagnosed with a mood or anxiety disorder and 21 percent were diagnosed with substance abuse.[5]

MHD can affect the prognosis and/or management of HIV infection. In particular, MHDs may impair patients' compliance with antiretroviral treatment regimens and impact associated health care utilization and expenditures.[6-10] Also, mental disorder diagnoses prior to HIV seroconversion are predictive of later MHD among HIV-positive men.[11]

Mental health disorders are relatively common among service members in general. The incidence rate of MHD diagnoses among all active component service members has been steadily increasing over the past several years. Recently, each year approximately one of 19 service members has received at least one incident MHD diagnosis; and in 2011, MHDs were the leading cause of hospitalizations of active component U.S. service members.[12-13]

The incidence and nature of MHDs among HIV-positive U.S. military members have not been recently and comprehensively described. In the early 1990s, HIV-infected soldiers (n=573) were found to have a higher incidence of psychotic, mental and adjustment disorders than seronegative soldiers; also, several psychiatric disorders were reportedly more prevalent among HIV seropositive Air Force members (n=95) than age-matched controls.[14-15] More recently, Hakre and colleagues reported that male HIV seroconverters in the U.S. Army and Air Force (n=274) were more likely than their seronegative counterparts to receive a MHD diagnosis within four years of detection of their HIV infections.[16] It is not known, however, if the finding is consistent across all service branches or if HIV-infected service members are more likely than those with other chronic sexually transmitted infections (e.g., herpes simplex virus [HSV2]) to receive MHD diagnoses after detection of their infections. This report documents incidence rates of MHD among HIV-positive service members and compares the rates to those of two HIV-unexposed control groups: an HSV2-infected group and a group of individuals without documented HIV or HSV2 infections.

METHODS

The surveillance period was 1 January 2000 through 31 December 2011. The surveillance population included individuals who had served at any time in the active component of the Army, Navy, Air Force, Marine Corps, or Coast Guard.

HIV-1 seropositivity was defined as two positive results from serologic testing of two different specimens from the same individual separated by at least one day or

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
MAY 2012		**00-00-2012 to 00-00-2012**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
The Risk of Mental Health Disorders Among U.S. Military Personnel Infected with Human Immunodeficiency Virus, Active Component, U.S. Armed Forces, 2000-2011	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Armed Forces Health Surveillance Center,11800 Tech Road, Suite 220 (MCAF-CS),Silver Spring,MD,20904**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES
MSMR Vol. 19 No. 5 May 2012,See also ADA562490

14. ABSTRACT

Mental health disorders (MHD) are reportedly more common among soldiers and airmen with HIV than their seronegative counterparts. Th is report documents the incidence rates of MHD among HIV-positive members of all service branches and compares the rates to those of two HIV-unexposed control groups: an HSV2-infected group and a group without documented HIV or HSV2 infections. Approximately 56 percent of HIV-infected service members received an incident diagnosis of a MHD six months or more aft er the initial detection of their infections. Cumulative incidence rates in nearly all MHD categories of interest were highest in the HIV group, intermediate in the HSV2 group and lowest in the referent group. Th e disorders more frequently diagnosed among HIV-infected service members compared to their uninfected counterparts were psychosis/schizophrenia, substance dependence substance abuse, bipolar disorder, suicide ideation and depression. Th e fi ndings are consistent with previous studies and reiterate the importance of long-term and comprehensive clinical monitoring of individuals diagnosed with HIV-1 infections.

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**5**	

one positive result from the serologic testing of the most recent specimen from an individual. Results of HIV tests are routinely maintained in the Defense Medical Surveillance System (DMSS). An incident case of HSV2 was defined as two or more medical encounters with a diagnosis of "genital herpes" (ICD-9-CM 054.1 with any fifth digit) in any diagnostic position.

Incidence rates of MHD were compared between three groups of active component service members:

HIV-infected cohort: service members who were documented as HIV-1 seropositive during the surveillance but did not receive case-defining diagnoses of HSV2 during or prior to the surveillance period.

HSV2-infected cohort: service members who were documented as incident cases of HSV2 during the surveillance period but who were not HIV-1 seropositive during or prior to the surveillance period.

Referent cohort: service members who were not documented as HIV-1 seropositive or as incident cases of HSV2 at any time. Ten randomly selected controls were matched to each case in the HIV cohort. The date of confirmation of HIV seropositivity for each case in the HIV cohort was used as the reference date for selection of the referent cohort.

The members of each cohort were followed from the time of entry into the HIV, HSV2 or referent groups until leaving active service, the end of the surveillance period, or documentation of an MHD of interest. For most MHDs, cases were defined by at least one inpatient or two ambulatory medical encounters (on separate days) with a MHD diagnosis of interest from six months after the date of HIV or HSV2 diagnosis until the end of follow-up **(Table 1)**. Cases of "suicide attempt" and "suicide ideation" were defined by one inpatient or one ambulatory encounter with the relevant diagnosis.

The six-month "reaction" or lag time after case-defining HIV or HSV2 diagnoses was implemented to exclude undiagnosed mental health disorders whose onsets may have preceded HIV/HSV2 infection and mental disorder "symptoms" that were expressions of acute reactions to receiving a HIV or HSV2 diagnosis. Of note in this regard, many MHD diagnoses require a six-month period of clinical symptoms to meet criteria for diagnosis as determined by the Diagnostic and Statistical Manual of Mental Disorders-IV (DMS-IV) (e.g., anxiety).[17]

Each individual was considered an incident case of MHD only once during the surveillance period. Poisson regression was used for direct calculation of incidence rate ratios (IRR); the regression analysis was adjusted for sex, race/ethnicity, and military branch of service, previous mental health disorder and deployment history.

TABLE 1. Mental health categories and case-defining diagnostic codes (ICD-9-CM)

Category	ICD-9-CM codes
Mental disorder diagnoses (ICD-9-CM: 290-319)	
Alcohol dependence	303.xx, 303.9x
Alcohol abuse	305.xx
Substance dependence	304.xx
Substance abuse	305.2x-305.9x
Post traumatic stress disorder	309.81
Major depression	296.20-296.26, 296.30-296.36, 296.90, 311
Bipolar disorder	296.0x, 296.1x, 296.4x-296.6x, 296.70, 296.80, 296.89
Anxiety disorder	300.00, 300.01, 300.02, 300.09
Personality disorders	301.0x-301.9
Schizophrenia or other psychosis	293.81, 293.82, 295.xx, 297.xx, 298.xx
Mental health problems (selected V-codes & E-codes)	
Suicide ideation	V62.84
Suicide attempt	E950.xx-E958.x

RESULTS

From 1 January 2000 through 31 July 2010, a total of 1,906 active component service members without HSV2 infection were serologically confirmed with HIV-1 infection, and 12,396 service members were diagnosed with HSV2 infection. For analysis purposes, 19,060 service members who were not diagnosed with HIV or HSV2 infections were randomly selected as the uninfected referent group **(Table 2)**.

Compared to the HSV2 and referent groups, the HIV group had higher proportions of service members that were male (97%), of black race/ethnicity (53%), in the Navy (43%) and of lower education and military grade **(data not shown)**. Compared to the referent group, the HSV2 group had relatively more females (52%) and service members of black race/ethnicity (31%).

Nearly 57 percent (n=1,076) of HIV-infected service members received an incident diagnosis of an MHD six months or more after the initial detection of their infections. For nearly all categories of mental disorders, incidence rates of diagnoses were highest in the HIV group, intermediate in the HSV2 group, and lowest in the referent group; for personality disorders, the highest incidence rate of diagnosis affected the HSV2 group. The MHD categories with the highest incidence rates among the HIV cohort were alcohol abuse, depression, anxiety, and alcohol dependence **(Table 2)**.

For 10 of the 12 MHDs of interest for this analysis, service members who were infected with HIV were more likely than uninfected referent cohort members to have received the diagnoses (after adjusting for differences in age, race, service, and other potentially confounding factors) **(Table 3)**. Compared to members of the referent cohort, individuals infected with HIV were approximately four times as likely to have documented diagnoses of substance abuse (IRR 3.9, 95% CI 2.2-6.9) and substance dependence (IRR 4.1, 95% CI 2.1-7.9) and approximately three times as likely to have diagnoses of suicidal ideation (IRR

TABLE 2. Incident diagnoses and incident rates of mental health disorders, among service members with HIV or HSV2 infection and uninfected referents, active component, U.S. Armed Forces, 2000-2011

Mental health disorder	HIV cohort (n=1,906)		HSV2 cohort (n=12,396)		Referent cohort (n=19,060)	
	No.	Rate[a]	No.	Rate[a]	No.	Rate[a]
Alcohol abuse	315	58.4	1,666	34.0	2,112	31.0
Alcohol dependence	70	11.6	275	5.2	353	4.8
Anxiety	142	24.4	1,043	20.4	801	11.1
Bipolar	16	2.6	117	2.2	75	1.0
Depression	312	57.5	1,732	35.2	1,115	15.6
Personality disorder	24	3.9	259	4.9	132	1.8
Psychoses, schizophrenia	12	1.9	36	0.7	36	0.5
Post-traumatic stress disorder	58	9.5	473	9.0	562	7.7
Substance abuse	38	6.2	121	2.2	115	1.6
Substance dependence	26	4.2	87	1.6	81	1.1
Suicide attempt	18	2.9	74	1.4	56	0.8
Suicide ideation	45	7.3	171	3.2	144	2.0

[a]Incidence rate per 1,000 p-yrs of service

3.2, 95% CI 1.8-5.5), bipolar disorder (IRR 3.3, 95% CI 1.5-7.1) and depression (IRR 2.9, 95% CI 2.4-3.5).

For 9 of the 12 MHDs of interest, service members who were infected with HIV were more likely than those infected with HSV2 to have received the diagnoses (after adjusting for potentially confounding differences between the groups). For 6 of the 12 MHDs of interest, HSV2-infected service members were more likely than referent group members to have received the diagnoses (after appropriate adjustment). Finally, MHD diagnosis experiences differed more between the HIV infected and the uninfected referent group than between the HIV-infected and the HSV2-infected group **(Table 3)**.

EDITORIAL COMMENT

This report suggests that HIV seroconverters in the active component of the U.S. military are at greater risk than HIV-negative service members of receiving at least one mental health diagnosis six months or more after initial detection of their infections. The MHDs that are the most frequently diagnosed among HIV-infected service members compared to their uninfected counterparts are psychosis/schizophrenia, substance dependence, substance abuse, bipolar disorder, suicide ideation and depression. The findings are consistent with those of studies among HIV-positive civilians and military members.[14-16,18]

The results of this analysis should be interpreted in light of several limitations. For example, the relatively high rates of MHD diagnoses among HIV-infected service members likely reflects at least in part better ascertainment of mental health problems among HIV-positive compared to uninfected service members. In this regard, some service members may have undiagnosed mental health problems that precede the acquisition and clinical detection of their HIV or HSV2 infections. Because HIV-infected service members attend regular follow-up visits for the management of their infections, frequent contact with care

TABLE 3. Incidence rates (per 1,000 person-years) and rate ratios of mental health disorders, among service members with HIV or HSV2 infection and uninfected referents, active component, U.S. Armed Forces, 2000-2011

Mental health disorder	HIV compared to referent	HIV compared to HSV2	HSV2 compared to referent
	Adjusted IRR (95% CI)	Adjusted IRR (95% CI)	Adjusted IRR (95% CI)
Alcohol abuse	1.63 (1.37-1.94)	1.74 (1.44-2.09)	1.12 (1.00-1.26)
Alcohol dependence	1.81 (1.20-2.72)	2.15 (1.39-3.31)	1.09 (0.82-1.45)
Anxiety	2.01 (1.55-2.61)	1.37 (1.05-1.79)	1.43 (1.43-1.69)
Bipolar	3.27 (1.51-7.07)	1.78 (0.85-3.75)	1.96 (1.12-3.44)
Depression	2.91 (2.38-3.55)	1.75 (1.43-2.13)	1.45 (1.26-1.66)
Personality disorder	1.35 (0.60-3.02)	0.86 (0.39-1.90)	1.62 (1.04-2.52)
Post-traumatic stress disorder	1.15 (0.82-1.61)	1.09 (0.77-1.54)	1.17 (0.97-1.41)
Psychoses, schizophrenia	6.22 (2.22-17.43)	3.16 (1.16-8.56)	1.86 (0.76-4.53)
Substance abuse	3.87 (2.17-6.91)	2.68 (1.51-4.76)	2.00 (1.24-3.20)
Substance dependence	4.06 (2.08-7.93)	3.40 (1.71-6.74)	1.76 (0.99-3.15)
Suicide attempt	2.71 (1.15-6.41)	2.65 (1.09-6.47)	0.97 (0.48-1.95)
Suicide ideation	3.19 (1.85-5.51)	1.78 (1.05-3.02)	2.03 (1.36-3.03)

providers may result in increased referrals for and diagnoses of previously undiagnosed MHDs relative to other service members. Of note, service members who received MHD diagnoses prior to their first HIV/HSV2 infection diagnoses were included in this analysis; however, comparisons of rates of MHDs after infection diagnoses were adjusted to account for differences in the mental health histories of the HIV, HSV2, and uninfected referent groups.

Also, some service members may have separated from military service within six months of their HIV or HSV2 diagnoses. If such individuals received MHD diagnoses after leaving service, incidence rates of post-infection MHD diagnoses documented in this report would underestimate the actual rates.

The HIV infection status of all military members is ascertained through routine periodic serological screening; however, military members are not routinely screened for HSV2 infection. As such, some HSV2-infected service members may have been inappropriately included in the HIV infected or uninfected referent cohorts. If so, it is unlikely that the main findings of the report would be significantly affected by the misclassifications.

Finally, the findings of this report have implications for follow-up care of HIV-infected service members. In particular, the findings reiterate the importance of long term and comprehensive clinical monitoring of individuals diagnosed with HIV-1 infections. In particular, each HIV-focused medical encounter should include careful mental health evaluations, with special concern for substance and alcohol misuse, depression, and anxiety. Behavioral, cognitive, and chemotherapeutic interventions should be managed by clinical specialists with expertise in such complex comorbid conditions.

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